Assignment 08

Due: Thursday, November 29, 2012 at 11:59 p.m.

- For this assignment you witness to download the compound the constants that can be used for testing compounds.
- Do **not** paste material from the teachnack into your assignment files, or auto-testing will fail (because constants or structures will be defected by the structure by t
- On this assignment in p completed with relative the completed with the design of your solutions.
- Remember that in the control of the collection of function of functions and test cases for the collection of functions and templates.
- Do not use reverse or member in any of your solutions.
- You may want to include defined constants to help reduce the writing for the examples and tests.
- For this and all subsequent assignments, you are expected to use the design recipe when writing functions from scratch. Be sure to follow all the steps of the design recipe, including the definition of constants and helper functions that include the design recipe, where appropriate.
- Do not copy the purpose directly from the assignment description. The purpose should be written in your own words and include references to the parameter tarnes of your jungtions. He was a simple to the parameter tarnes of your jungtions.
- The solutions you submit must be entirely your own work. Do not look up either full or partial solutions on the Internet or in printed sources.
- Do not send any code files by email to any course staff. It with not be accepted by course staff as an assignment submission. Course staff will added ug code email to hem. 103. COM
- Test data for all questions will always meet the stated assumptions for consumed values.
- · Read each question carefully for restrictions.
- Read the course Web page for nore interpolition of stignment policies and how to organize and submit your work. Follow the instructions in the style guide. Specifically, your solutions should be placed in files a08qY.rkt, where Y is a value from 1 to 3.

Language level: Beginning Student with List Abbreviations

Coverage: Module 8

Useful structure and data definitions:

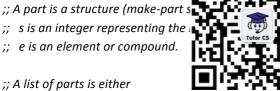
```
define-struct ae (fn args))
;; A arithmetic expression (aexp) is either
;; * a number, or
;; * a structure (make-ae f alist), where
      * f is a symbol in the set '* or '+
      * alist is an aexplist.
;;
;; An aexplist is either
  * empty or
;; * (cons a alist), where
    * a is an aexp and
    * alist is an aexplist.
;; A leaf-labelled tree (IIt) is one of the following:
;; empty,
;; (cons I1 I2) where I1 is a non-empty Ilt and I2 is an Ilt, or
;; (cons v I) where v is an integer an I is an IIt.
```

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- ;; A compound is a structure (make-compound n l), where
- ;; n is a symbol and
- ;; I is a list of parts



- ;; empty or
- ;; (cons p lop), where
- p is a part and
- lop is a list of parts.



;; An element is a structure (make-element n m) where Assignment Project Exam Help ;; n is a symbol and

- ;; m is a number (the molar mass, that is the mass of one mole of the substance, 6.02×10^{23} atoms).
- 1. Recall the substitution rules in the from Module 1 the deep lind of the properties a full trace of a Scheme expression. Assume that you are tracing an arithmetic expression that only contains non-negative numbers, and the mathematical functions + and *. Here is a sample trace:

6 2 (* 4 1)) 7 (+ 5 (* 6 2 4) 7 https://tutorcs.com (+5487)

The substitution rules that are used in this kind of trace are:

- A value (such as a number) cannot be further simplified.
- For a built-in function application, use mathematics rules.
- First evaluate the arguments, and then apply the function to the resulting values.
- When there is a choice among two or more substitutions, we take the leftmost one.

Each of the lines in the trace above is an example of arithmetic expressions in Scheme. Any arithmetic expression in Scheme can be represented by an aexp. Write a function called step that consumes a Scheme expression (ex) in the form of an aexp and produces an aexp that represents the next step in a trace of ex. If ex is a number, then there are no more steps in the trace. In this case the function produces the symbol 'Done. Notice in the example that simplifying an argument like (+ 1 2 3), where all of the arguments following the mathematical operator are numbers, is done in just one step. For example, if the ex1 is an aexp representing (+ 5 (* (+ 1 2 3) 2 (* 4 1)) 7) then (step ex1) produces an aexp representing the Scheme expression (+ 5 (* 6 2 (* 4 1)) 7).

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2. Write a function called longest—rath that consumes a reaf-labelled red (int) called tree. The function produces the length of the longest path from the root of tree to any of its leaves. The length of the path from the root of a leaf-labelled tree is equal to the number of branches between the root and the leaf node in a leaf-labelled tree on slide 30 in Module 9, the longest path is 3, since the leaves containing the values 2, 3, 6, 7, and 8 are all length 3 and there are not leaves.

Notes:

- The longest path of in an empty tree is 0.
- It is not possible for a leaf-labelled tree to have a single node. The smallest non-empty leaf-labeled tree has at least two recommends and the smallest non-empty leaf-labeled tree has at least two recommends.
- 3. Write a function count-atoms that consumes a compound (c) and a symbol (e1) and produces the number of atoms in c where the name of the entire of atoms in c where the name of the entire of atoms in c where the name of the entire of atoms in c where the name of atoms in c which have 4 to atoms in each), and (count-atoms calcium-phosphate to) produces 0. Note that an element is composed of one atom.

 Add the compound teachpack to your solution. However, do not copy any definitions from the teachpack

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(there will be errors if you do). You may use the data defined in the teachpack for testing.

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